Threat Air Defense Laboratory

Air Combat Environment Test & Evaluation Facility

Overview

The Threat Air Defense Laboratory (TADL) provides realistic closed-loop simulations of threat weapons systems to stimulate aircraft EW systems during developmental and operational testing in order to provide hardware-in-the-loop countermeasures effectiveness data. This data is used to quantitatively assess the performance of systems under test. The TADL verifies the functionality of radar warning receivers, defensive electronic countermeasures suites, jammers, jamming decoys, standoff jamming against man-in-the-loop threat surface-to-air missile (SAM) and early warning acquisition (EWACQ) radar stimulator systems.

The TADL, in conjunction with other laboratories in the ACETEF, supports installed systems integration testing. The system under test is stimulated by threat RF signals and evaluated while integrated on the host platform in a dense combat environment with other associated avionics functioning. The system under test may be in the anechoic chamber, the shielded hangar or on a laboratory bench.

All search, acquisition, track and missile engagement waveforms of the transmitted radar signals are simulated and provided to the system under test, including the effects of radar antenna scan modulation, electronic countermeasures (ECM) antenna pattern attenuation and radar range attenuation.

The TADL is fully integrated with the Manned Flight Simulator (MFS) for pilot-in-the-loop interactions, the Simulated Warfare Environment Generator (SWEG) for scenario control and the Advanced Tactical Electronic Warfare Environment Generator for RF distribution and angle of arrival.

The TADL also supports studies and analyses of the impact to threat radar performance from radar cross-section modifications, tow-line length modifications, situational awareness and target maneuvers.

Command Control Laboratory Simulator

The Command Control Laboratory Simulator (C2LS) is a threat software simulation system. The C2LS software outputs actual command, control and status messages that can be used to control and respond to either threat simulators or simulations. Actual displays are replicated on a touch screen monitor that allows for man-in-the-loop operation through this graphical user interface. The C2LS operates in real-time and is interfaced with the EWACQ, I-23 and SWEG to provide a realistic threat environment, accept situational track data, and hand off targets to radar and weapons simulations systems.

Threat Air Defense Laboratory

For more information contact:

John Kriz
48150 Shaw Road, Building 2109
Patuxent River, MD 20670
http://arf.navair.navy.mil

(301) 342-6117
KrizJE@navair.navy.mil

Threat Air Defense Laboratory

NAVAIR

Air Combat Environment Test & Evaluation Facility

Early Warning Acquisition Radar Stimulator

The Early Warning Acquisition (EWACQ) Radar Stimulator is a closed-loop simulation of several foreign long-range search radar for use in jammer measure of effectiveness testing and radar warning receiver performance testing. This hardware-in-the-loop system combines radar receiver hardware and signal processing with target models, target generation hardware, antenna and environment modeling. The EWACQ is reconfigurable for waveform emulation of radar within frequency range, and receiver hardware is modular. EWACQ has raw video displays, moving target indicator and target tracking with synthetic displays. The target tracker performs target acquisition through trackwhile-scan and tracks six targets. Two of these targets can be handed off to the I-23 Radar/ Missile Stimulator for tracking and engagement.

Threat Air Defense Laboratory Workstation

I-23 Radar/Missile Stimulator

The I-23 Radar/Missile Stimulator (I-23) closed-loop simulator is a highfidelity SAM threat system stimulator that simulates all modes and waveforms of the target engagement radar of both the naval and land-based variant of a high-priority SAM threat as well as the associated missile. It is a hardware-in-the-loop system combining radar and seeker receiver hardware and signal processing with target models, target generation hardware, environment models and validated threat/ missile flyout models. Target trajectories available are internally generated linear targets or maneuvering targets when integrated with SWEG, MFS cockpits or minicrew stations. Statistical clutter and jet engine modulation are also simulated.

J-Band Advanced Technology Simulator

The J-Band Advanced Technology Simulator (JBATS) is a closed-loop, high-fidelity, short-range point defense threat system stimulator that simulates the target engagement radar of six RED (enemy)/ROW (rest-of-world) naval and land-based point defense threat systems, as well as the associated command-guided missiles. The target acquisition radar displays for each threat are also simulated, and target tracks from a SWEG or standalone scenario can be displayed for operator action and handoff to the target engagement radar. It is a hardware-in-the-loop system combining radar receiver hardware and signal processing target models, environment models and validated threat modeling and missile flyout models.